3FIELD

E-FOC DRIVE SERIES

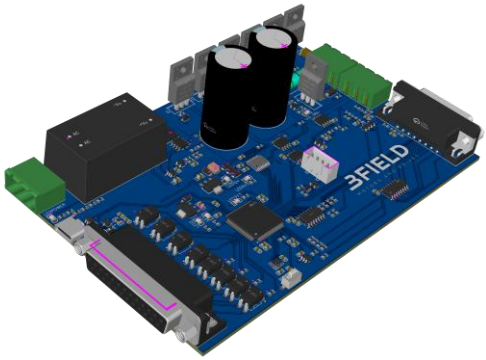
BF72SHES-DC
BF240SHES-AC

Rev.01 (2025)

BF72SHES-DC
BF240SHES-AC

BF72SHES-DC

BF240SHES-AC



FEATURES

- Superior TPA (Torque per Ampere)
- Reduced copper loss
- Enhanced precision in PMSM motor control
- Increased efficiency
- Optimized for SMPMSM with non-sinusoidal BEMF
- Easy USB setup with BFCoreIDE
- High-performance design for demanding applications

APPLICATIONS

BF72SHES-DC and BF240SHES-AC are general purpose BField e-FOC drives designed for BLDC and PMSM motors.

GENERAL DESCRIPTION

The e-FOC Drive optimizes performance for all three-phase SMPMSM with trapezoidal Bemf, delivering unparalleled precision and efficiency. Trapezoidal BEMF flat area span can be customized according to your motor, e.g., 150º, 120º, 90º, etc.

ENVIRONMENT CHARACTERISTICS

TEMPERATURE RANGE	0ºC … +50ºC
ALTITUDE	<1000 m
HUMIDITY	<90%RH (without condensation)

3FIELD
MOTORS AND DRIVES

BF72SHES-DC
BF240SHES-AC

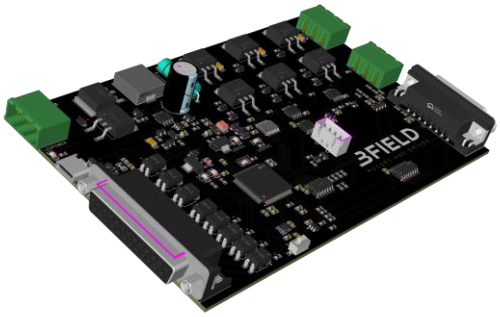
OPERATING RATES AND TECHNICAL DETAILS

	BF72SHES-DC	BF240SHES-AC
POWER SUPPLY VOLTAGE	12 - 72 V_{DC}	100 - 240 V_{AC}
MAXIMUM OUTPUT CURRENT	14 A	4.5 A
MAXIMUM OUTPUT POWER	1 kW	
MOTOR TYPES SUPPORTED	BLDC, PMSM Sinusoidal and non-sinusoidal	
PROTECTIONS	Overcurrent protection, DC-Link Overvoltage protection, Over Temperature, Reverse Polarity Protection(BF72SHES-DC)	
DIGITAL INPUTS (ISOLATED)	4	
DIGITAL OUTPUTS (ISOLATED)	4	
MAXIMUM I/O VOLTAGE	30 V_{DC}	
MAXIMUM I/O CURRENT	50mA	
ANALOG INPUTS	1	
MAXIMUM ANALOG INPUT VOLTAGE	3.3 V_{DC}	
ENCODER INPUTS AND TYPE	1 INPUT, LINE DRIVER (5V) ENCODER: A, /A, B, /B, Z, /Z.	
BRAKE CHOPPER	INTERNAL / EXTERNAL (SELECTABLE) *PROGRAMMABLE THROUGH SETUP*	
HALL INPUT	A, B, C (or V, W, U), 5V, GND	
SENSORLESS OPERATION	Luenberger Observer or ZCD (Zero Cross Detection) BEMF	
COMMUNICATION/OPERATION/SETUP	USB-C 2.0 FS	
CONTROL OPERATION TYPE	BFIELD e-FOC Traditional FOC Square wave Current	
CONTROL OPERATION MODES	Position Control, Speed Control, Torque/Current Control	
OPERATING FREQUENCY	10KHz	

BF72SHES-DC
BF240SHES-AC

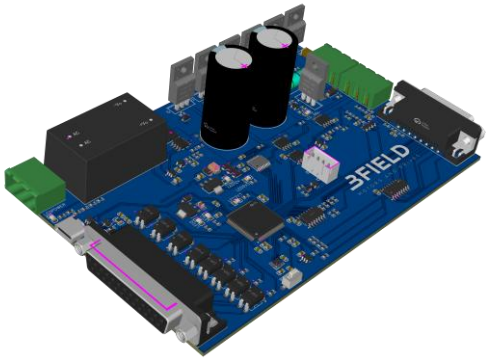
DIMENSIONS

BF72SHES-DC



Length (L)	Width (W)	Height (H)
~150mm	~100mm	~30mm

BF240SHES-AC



Length (L)	Width (W)	Height (H)
~150mm	~100mm	~50mm

The actual product dimensions may vary according to the model and version/update.

BF72SHES-DC
BF240SHES-AC

Key features

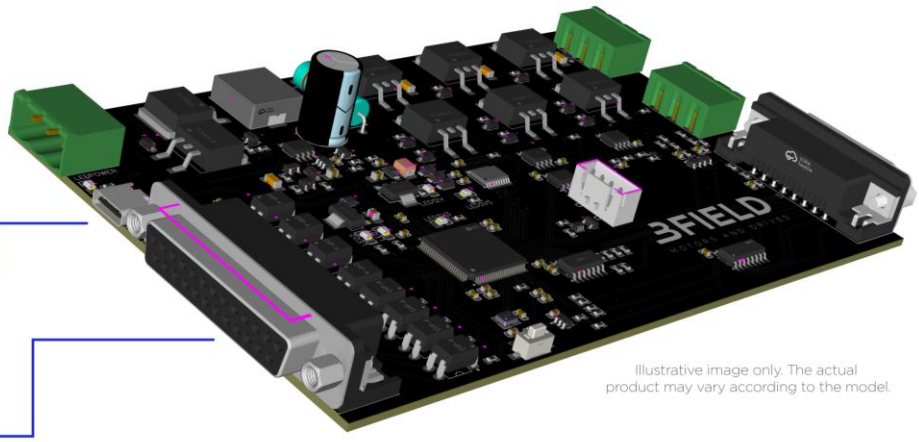
BF72SHES-DC

General Purpose BField e-FOC Drive with DC Voltage Input Supply

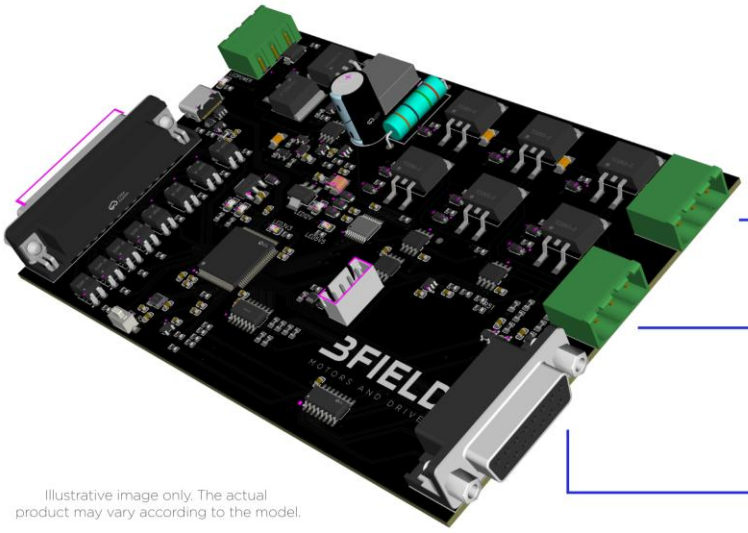
Power Input:
12-72Vdc + PE
Reverse Polarity Protection (RPP)

USB 2.0 Type C
Communication and Setup

DB-25:
4 Digital I/O (isolated)
1 Analog Input (3v3)
5v, 3v3 and GND



Illustrative image only. The actual product may vary according to the model.



Illustrative image only. The actual product may vary according to the model.

Brake Chopper Input:
Internal and External

Motor Output: U, V, W

DB-15:
Digital Hall Input (A, B, C) (5V)
Line Driver Encoder (5V)
5v and GND

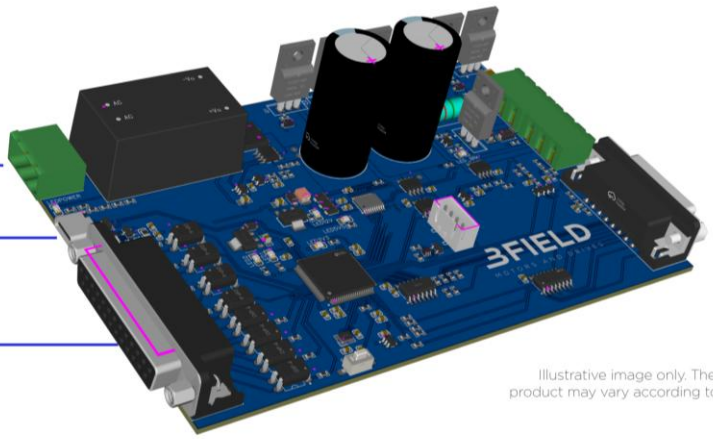
3FIELD
MOTORS AND DRIVES

BF72SHES-DC
BF240SHES-AC

Key features

BF240SHES-AC

General Purpose BField e-FOC Drive with AC Voltage Input Supply



Power Input:
100-240V_{AC} + PE

USB 2.0 Type C
Communication and Setup

DB-25:
4 Digital I/O (isolated)
1 Analog Input (3v3)
5v, 3v3 and GND

Illustrative image only. The actual product may vary according to the model.

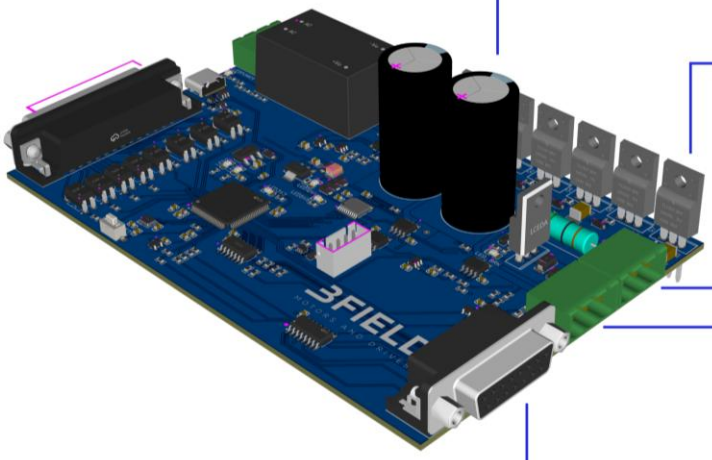
200uF DC Link Capacitor

Ready for Heatsink

Brake Chopper Input:
Internal and External

Motor Output: U, V, W

DB-15:
Digital Hall Input (A, B, C) (5V)
Line Driver Encoder (5V)
5v and GND



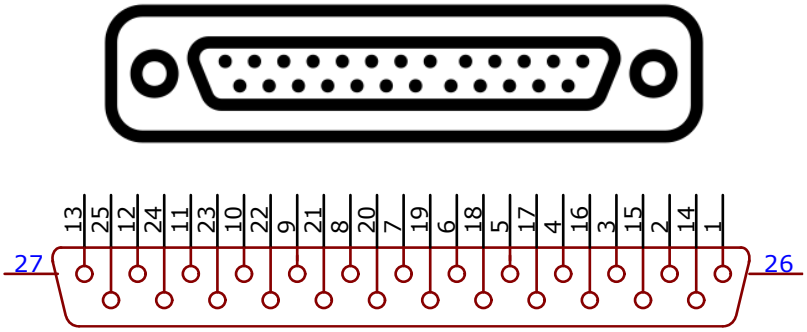
Illustrative image only. The actual product may vary according to the model.

BF72SHES-DC
BF240SHES-AC

CONNECTOR AND PINS ARRANGEMENT

SIGNAL CONNECTORS:

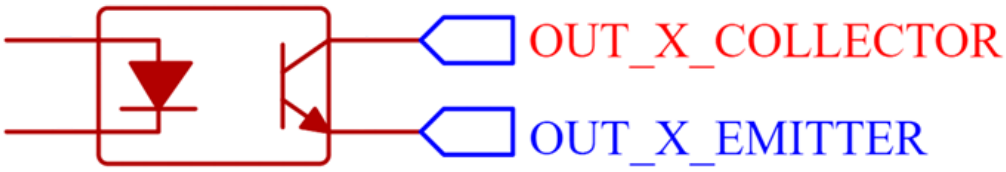
DB25 - ANALOG INPUT, DIGITAL INPUT, DIGITAL OUTPUT



Pin Number	Signal/Function	Description
1	OUT 1 - Collector	Output optocoupler - Collector Terminal (max 50mA)
2	OUT 2 - Collector	Output optocoupler - Collector Terminal (max 50mA)
3	OUT 3 - Collector	Output optocoupler - Collector Terminal (max 50mA)
4	OUT 4 - Collector	Output optocoupler - Collector Terminal (max 50mA)
5	INPUT 1 - Cathode	Input optocoupler - Cathode Terminal (max 50mA)
6	INPUT 2 - Cathode	Input optocoupler - Cathode Terminal (max 50mA)
7	INPUT 3 - Cathode	Input optocoupler - Cathode Terminal (max 50mA)
8	INPUT 4 - Cathode	Input optocoupler - Cathode Terminal (max 50mA)
9	NC	Not Connected
10	NC	Not Connected
11	ANALOG INPUT	Analog Input (max voltage 3v3)
12	ANALOG GND	Analog Ground Signal
13	GND	Ground Signal
14	OUT 1 - Emitter	Output optocoupler - Emitter Terminal (max 50mA)
15	OUT 2 - Emitter	Output optocoupler - Emitter Terminal (max 50mA)
16	OUT 3 - Emitter	Output optocoupler - Emitter Terminal (max 50mA)
17	OUT 4 - Emitter	Output optocoupler - Emitter Terminal (max 50mA)
18	INPUT 1 - Anode	Input optocoupler - Anode Terminal (max 50mA)

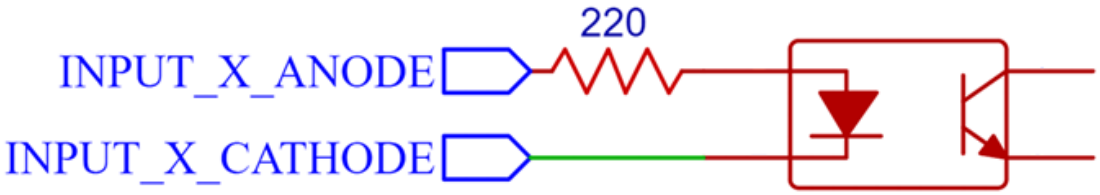
19	INPUT 2 - Anode	Input optocoupler - Anode Terminal (max 50mA)
20	INPUT 3 - Anode	Input optocoupler - Anode Terminal (max 50mA)
21	INPUT 4 - Anode	Input optocoupler - Anode Terminal (max 50mA)
22	NC	Not Connected
23	NC	Not Connected
24	3v3	3v3 signal (max current: 100mA)
25	5v	5v signal (max current: 100mA)
26 and 27	SHIELD	Shield connected to PE

DIGITAL OUTPUT DIAGRAM



It's recommended to use a resistor either in the **OUT X - COLLECTOR** or **OUT X - EMITTER Pin** for current limiting.

DIGITAL INPUT DIAGRAM



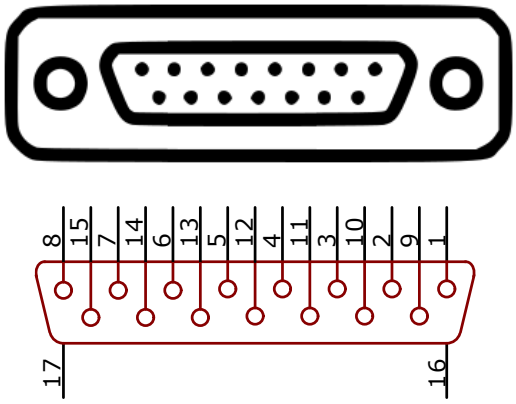
Note that there is an internal **220 Ohms** resistor connected between **Input X Anode Pin** and the optocoupler anode.

BF72SHES-DC
BF240SHES-AC

CONNECTOR AND PINS ARRANGEMENT

SIGNAL CONNECTORS:

DB15 - HALL SENSOR INPUT, LINE DRIVER ENCODER INPUT



Pin Number	Signal/Function	Description
1	5v	5v signal (max current: 100mA)
2	5v	5v signal (max current: 100mA)
3	GND	Ground Signal
4	HALL A	Hall Input Signal A (5v)
5	HALL C	Hall Input Signal C (5v)
6	ENCODER Z	Encoder Input Signal: Z (5v)
7	ENCODER B	Encoder Input Signal: B (5v)
8	ENCODER A	Encoder Input Signal: A (5v)
9	5v	5v signal (max current: 100mA)
10	GND	Ground Signal
11	GND	Ground Signal
12	HALL B	Hall Input Signal B (5v)
13	ENCODER /Z	Encoder Input Signal: /Z (5v)
14	ENCODER /B	Encoder Input Signal: /B (5v)
15	ENCODER /A	Encoder Input Signal: /A (5v)
16	SHIELD	Shield connected to PE
17	NC	Not Connected

BF72SHES-DC
BF240SHES-AC

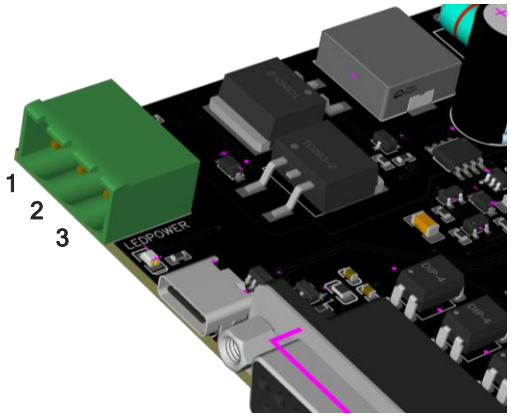
CONNECTOR AND PINS ARRANGEMENT

POWER CONNECTORS:

INPUT POWER SUPPLY

BF72SHES-DC

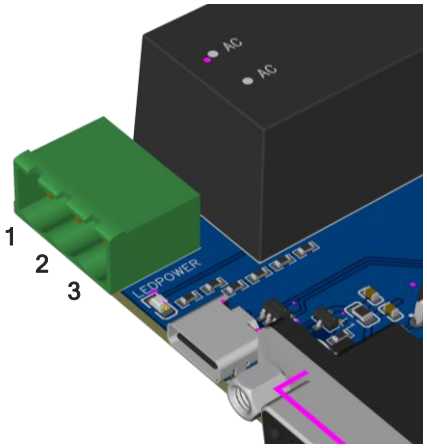
PIN NUMBER	FUNCTION
1	Positive Voltage Supply ($+V_{DC}$)
2	Negative Voltage Supply ($-V_{DC}$)
3	Shield



Input Voltage: 12 - 72 V_{DC}
There is a Reverse Polarity Protection circuit

BF240SHES-AC

PIN NUMBER	FUNCTION
1	Primary Power 1
2	Primary Power 2
3	Shield



Input Voltage: 100 - 240 V_{AC}

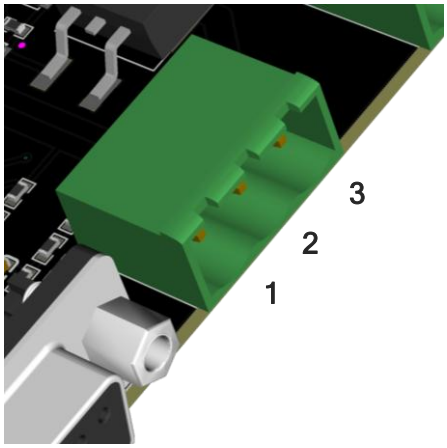
BF72SHES-DC
BF240SHES-AC

CONNECTOR AND PINS ARRANGEMENT

POWER CONNECTORS:

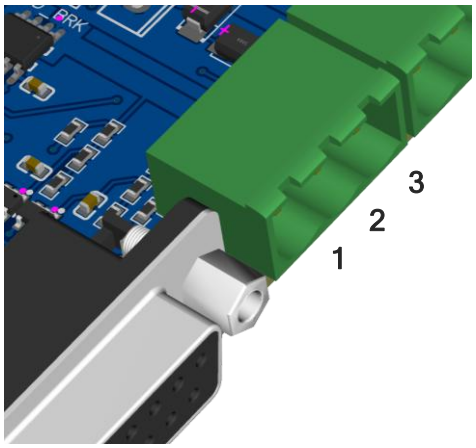
MOTOR POWER CONNECTOR

BF72SHES-DC



PIN NUMBER	FUNCTION
1	Phase A (U)
2	Phase B (V)
3	Phase C (W)

BF240SHES-AC



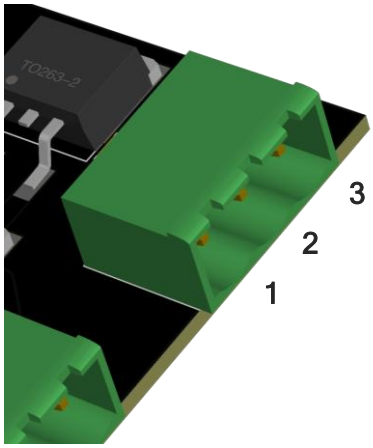
BF72SHES-DC
BF240SHES-AC

CONNECTOR AND PINS ARRANGEMENT

POWER CONNECTORS:

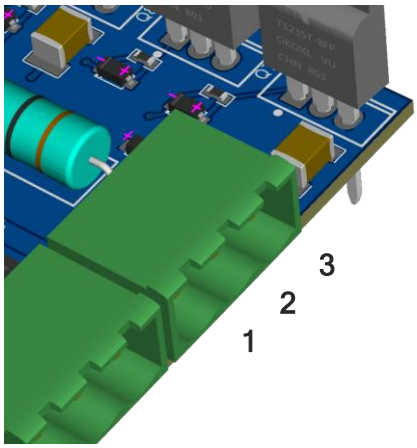
BRAKE CHOPPER CONNECTOR

BF72SHES-DC



PIN NUMBER	FUNCTION
1	BRK (+) / VBus (+)
2	BRK INTERNAL
3	BRK (-)

BF240SHES-AC



BRAKE RESISTOR CONFIGURATION:

EXTERNAL RESISTOR: must be connected in pins 1 and 3. Pin 2 can't be used.

INTERNAL RESISTOR: the drive has a built-in 100Ω 5W brake resistor. To use it, pins 2 and 3 must be short-circuited and pin 1 can't be used.

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